PROGRESS REPORT

GRANT NUMBER: 7310035
High Capacity Airborne Wind Turbine
Altaeros Energies
5/1/2015 – 7/31/2015

Deliverables Submitted
No official deliverables were scheduled to be submitted this period.

Budget
No costs were submitted for this period.

Schedule Status
Our engineering team is fully hired and proceeding to finalize the BAT30 design in anticipation of this project. Our permitting team has also made significant progress towards getting FAA approval including completing the final submission of our permitting application after extensive back and forth with the FAA on the application. Our project is now slated for a summer 2016 deployment schedule.

Percent Complete

Tasks/Milestones	Start Date	End Date	Percent Complete
Task 1: Final site selection, permitting, and community forum	Mar-13	Mar-15	70%
Task 2: 30 kw turbine assembly and testing in Maine	Jul-13	Jun-16	35%
Task 3: Complete instrumentation plan and shakedown test plan	Jul-13	Jun-16	30%

Work Progress

Task 1:

- Cost Share Complete.

- Permitting
  - Altaeros has had multiple phone conversations with the FAA to help clarify the details of how they want to receive the project data (coordinates and elevation) for the unique nature of our high altitude wind turbine project.
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  - Altaeros submitted its FAA Obstruction Evaluation during this reporting period, which includes BAT specification, lighting and marking. Our conversation with Donna O'Neill revealed that this process will take, at a minimum, 120 days to secure. The expected FAA approval window will be pushed from the original August target into the fall.
  - Altaeros last spoke with the FAA's Obstruction Evaluation Group to verify site coordinates and Above Mean Sea Level (AMSL) altitude of our project near Fairbanks, Alaska. The officer in the group, Cesar Perez, guided us to select the appropriate AMSL points that are least likely to be rejected by the FAA; the FAA prefers a uniform box above the ground for ensuring pilot safety. Since the application submission, the Obstruction Evaluation Group has been very open and helpful in conversations.

- Community Assessment
  - Altaeros is currently working with the Pease International Airport in Massachusetts as top priority site for local testing prior to deployment in Alaska. Pease administrators are now reviewing our proposal to use airfield and hangar

facilities for local testing, which would replace the Maine test site with a site closer to our Boston headquarters. We maintain access to our Maine test site as a backup as needed.

Task 2:

- 30 kw turbine assembly and testing.
    - Our team made final selections on the inflatable shell design, launch-and-recovery, and power system architecture. Our goal is to have final design sketches of the full prototype and all sub-systems available at the next review
        - Our current selected shell design has been changed to a traditional blimp/aerostat shape with the turbine mounted at the back. After extensive manufacturing research, it was determined that this offers a lower cost of energy and higher reliability than the original ring-shaped design with the turbine mounted in the middle.

    - Detailed design and development of a number of key components is being outsourced to domain experts, including
        - Wind turbine and generator
        - Inflatable shell structure
    - Power converters (combination of commercially available and custom) The development schedule for all major components has been validated with the key vendors who will be assisting with the design and fabrication of the pilot unit. At present, the wind turbine system has the highest risk of schedule overruns. It is expected that if the turbine is delayed, the rest of the system will be fully tested prior to integration of the turbine, in order to minimize the overall program setback.

Task 3:

- Test experience and data from the previous prototype continues to inform the development of the instrumentation plan
- Team has identified preliminary sensors and instrumentation for the 30kW system

Future Work

Task 1:

- Site Selection
    - Preliminarily completed (Eva Creek), unless future permitting problem arises.

- Permitting
    - Continue to work with FAA and airspace consultants to complete FAA aeronautical evaluation of Eva Creek site.
    - Continue formulating permitting strategy for Fish & Wildlife approval of Eva Creek Site.

- Community Assessment (after FAA permitting)
    - Initiate follow up conversations to test hypothesis of no community concerns at Eva Creek site, and evaluate need for a Community Forum.

Task 2:

- Complete Alaska prototype full pilot design
    - Complete and freeze full high level system design
    - Complete generator selection and rotor/turbine design.

- Complete design of ground station and final winch and tether selection.
- Update controls and communication system, including remote monitoring and data collection.
- Implement fault detection and handling capabilities.
- Work to improve total system reliability.

Task 3:

- Instrumentation plan and shakedown test plan
  - Develop initial test plan for 30kW turbine after design completed.